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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,875	09/22/2003	Naoteru Matsubara	65933-044	4231
7590 06/29/2006				
McDERMOTT, WILL & EMERY		EXAMINER		
600 13th Street, N.W.		IM, JUNGHWA M		
Washington, DC 20005-3096				
		ART UNIT	PAPER NUMBER	
		2811		

DATE MAILED: 06/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/664,875	MATSUBARA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Junghwa M. Im	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>4/24/06</u> .   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites a limitation of “a multilayered film including a first dielectric film, an etching stopper and a second dielectric film stacked on said semiconductor substrate in this order; and ... wherein said metal interconnect is embedded in an area at least including a trench formed in the second dielectric film using the etching stopper,” indicating that the second dielectric film is a layer 6 in Fig. 2F of the instant invention. And claim 1 further recites that “the bottom of the trench formed in the second dielectric layer is located under the under surface level of the etching stopper and is located inside the first dielectric film,” indicating that the second dielectric film is a layer 4 in Fig. 2F. It is further confusing how the bottom of the trench is located inside the first dielectric film 2 while the bottom of the trench is formed in the second dielectric film.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parikh (US 6225207) in view of Gates et al. (US 6603204), hereinafter Gates.

Regarding claim 1, insofar as understood, Fig. 4F of Parikh shows a semiconductor device comprising:

a semiconductor substrate [410];

a multilayered film including a first dielectric film [412, 416], an etching stopper [418] and a second dielectric film [420] stacked on said semiconductor substrate in this order; and

a via plug [452] and a metal interconnect [450] formed in said multilayered film;

wherein the upper surface of said etching stopper is located under the upper surface level of said metal interconnect and the under surface of said etching stopper is located over the under surface level of said metal interconnect, and trench ifs formed in the second dielectric layer and the bottom of the trench is located inside the first dielectric layer.

wherein said metal interconnect is embedded in an area at least including a trench formed in the second dielectric film using the etching stopper and the bottom of the trench formed in the second dielectric layer is located under the under surface level of the etching stopper

Fig. 1F of Parikh shows substantially the entire claimed structure except “the dielectric constant of said etching stopper being larger than that of said first and second dielectric films.”

Fig. 8 of Gates shows a semiconductor device with a multilayered film [52'] including a first dielectric film [54'], an etching stopper [56'] and a second dielectric film [58'] stacked on said semiconductor substrate in this order, the dielectric constant of said etching stopper being larger than that of said first and second dielectric films (col. 4, lines 8-64).

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It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Gates into the device of Parikh in order to have the dielectric constant of the etching stopper being larger than that of the first and second dielectric films to enhance the circuit speed of the integrated circuit (col. 1, lines 7-16).

Regarding claim 2, Gates discloses the semiconductor device wherein the dielectric constant  $[k=1.1-5.5]$  of said etching stopper is less than or equal to 5 [col. 4, lines 60-65].

Regarding claims 3 and 4, Gates discloses the semiconductor device wherein the dielectric constant of said etching stopper is larger than or equal to a summation of 2 and the dielectric constant of either one of the dielectric constants  $[k=1.4-3.5]$  of said first and second dielectric films [col. 4, lines 15-17].

Regarding claim 5, Gates discloses said metal interconnect includes copper as a constituting element [col. 7, lines 34-36].

### ***Response to Arguments***

Applicants' arguments filed April 11, 2006 have been fully considered but they are not persuasive. The rejection stands, modified only to accommodate the amendments made to the claims by Applicants. New rejections are made in response to Applicants' amended claims. In addition, the examiner presents the remarks below in response to Applicants' arguments.

Applicants argue that "Specifically, claim 1 has been clarified by reciting that '... the bottom of the trench formed in the second dielectric film is located under the under surface level of the etching stopper and is located inside the first dielectric film.' " As discussed in detail in the office action above, this aspect is not shown in the instant invention, and furthermore, it is

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confusing how the bottom of the trench can be in the second dielectric film and at the same time can be located in the first dielectric film.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jmi



EDDIE LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800